1. Applicant's election of group I, claims 1-13 (& new claim 23) in the reply filed on 3/26/2008 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

In the review of applicant's 3/26/2008 response, the examiner found no explicit affirmation of the oral restriction requirement & election made on 7/18/2005, with the written version thereof supplied on page 2, sections 1-4 of the action mailed 9/29/2007, however as applicant's amended claims submitted with **response list nonelected group II product claims 14-22 as withdrawn**, this will be taken as an effective affirmation of the election, & as there are no arguments for traverse, this may be considered effectively without traverse, due to an incomplete response.

2. Applicant's amendment of claim 3 removes the objection set forth in section 5 of the action mailed 9/29/2007, while other amendments to the claims appear to have removed the 112, second paragraph rejections as set forth in section 6, however in some case the amendments have created new or modified problems, which will be discussed below. Also, the examiner notes applicant's comments concerning "glass-like" being discussed on page 3, however that discussion does not provide a clear definition appropriate for use in such a term in the claim, as it merely describes that certain depositions of silicon dioxide may be cold glasslike, while giving examples of other categories of materials (e.g. oxide materials or nitrite materials) as being comprised in the category, however examples are not an adequate definition when they do not completely define the scope.

3. Claims 1-13 & 23 are objected to because of the following informalities: it is noted that in the claims, particularly claim 1 there is an inconsistency in use of singular or plural with respect to "at least one coating layer[s]". Particularly see in claim 1, lines 2 & 7, plus claim 3, 5-7 & 10, in which the term is singular; while in claim 1, line 9 & claims 2 & 8-9 the term is plural. Appropriate correction is required.

4. **Claims 1-13 & 23** are rejected under 35 U.S.C. **112, first** paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1-13 & 23 are rejected under 35 U.S.C. **112, first** paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Applicant has amended their independent claim to require that the coating layer specifically claim all "non-polymeric **dielectric** coating materials" (emphasis added), however the examiner found absolutely no discussion of dielectric materials *per se* in applicant's specification. While glasses are usually (but not always) dielectric materials, conductive or dielectric properties were not discussed as one of the properties being mimicked by the conformal silicon dioxide discussed on page 3, fourth paragraph, which was "categorized as a 'glasslike' coating, inasmuch as that term is used herein to refer to a coating that is comprised of one or more non-polymeric materials (e.g., one or more oxide materials, one or more nitrite materials)". While this rather strained phrase can be said to generally support using "non-polymeric materials" (although implies that it only encompasses those that are "glass-like"), where those materials may be oxide materials or nitrite materials, the specific claim of all non-polymeric dielectric materials is considered **New Matter**, as the specification does not appear to have teachings particularly directed to the category of dielectric depositions, especially considering that there are many conductive oxide materials. With respect to claim 11, which is specifically directed to using particular elements in forming the coating layer, where these elements were discussed in the specification on the last paragraph of page 5; this paragraph does not discuss these elements being deposited in all possible non-polymeric dielectric materials, but only in oxide coatings generally, thus while the examiner expects that the specific

oxides ion plated from these elements (unless doped or very nonstoichiometric) would deposit dielectric oxides, the claims are neither limited to oxides, nor does the specification discuss dielectrics from these elements or dielectrics in general, hence the scope of the claims does not appear to be properly or reasonably supported or enabled by the original specification, thus would appear to encompass New Matter & lack proper enablement for the scope of the claims as written. For instance, the examiner finds no enablement or suggestion for deposition of carbide materials, however there are many dielectric carbide materials, which are non-polymeric, as well as being conductive carbide materials that are non-polymeric.

There is additionally a problem in dependent claim 4 with respect to support, since while the second paragraph on page 3 discusses various nonplanar surfaces that may be conformally coated by the applicant's process, there was no disclosure found that required the combination of at least one corner & at least one undulating surface or at least one grating (unless of course the grating has corners), thus claim 4 requires encompassing configurations which are neither taught nor necessitated in the original specification, thus lack proper enablement & may be considered to encompass **New Matter**. The examiner further notes options like steps in claim 4 inherently might be considered to inherently have corners, while wells frequently do at their bottoms & tops (e.g. figure 2), and that there is plenty of support for corners by themselves as found on page 2, 2nd-3rd paragraphs; page 3, 2nd paragraph; page 10, 2nd paragraph; page 11, last paragraph & page 12.

5. **Claims 10-11 & 13** are rejected under 35 U.S.C. **112, second** paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

While applicant has clarified the language in claim 1 by be deleting the "forming..." step, the language associated with this step is still present in claims 10 & 13, such the terminology therein lacks proper antecedent basis & is confusingly related to the "depositing..." limitation of the independent claim.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. **Claims 1-7, 10-12 & 23** are rejected under 35 U.S.C. **102(b)** as anticipated by <u>or</u>, in the alternative, under 35 U.S.C. **103(a)** as obvious over **Hahn** (4,990,233), optionally considering <u>teaching references</u> **White** (RE 3401 or 4,420,386), incorporated-by-reference in Hahn.

Claim 13 is to rejected under 35 U.S.C. **103(a)** as being unpatentable over **Hahn** (4,990,233), in view of **White** (4,420,386).

In **Hahn**, particularly see the abstract; figures 1-5, 2; col. 1, lines 5-14 & 63-col. 2, lines to & 14-47, especially 17-18, 23-25, 28-31 & 40-45; col. 3, lines 7-30 & 45-66; col. 4, lines 8-30 & 58-col. 5, line 5 & example 2 bridging cols. 5-6, for teachings of ion plating metal oxides in general, titanium oxide specifically, onto the interior surface of a metal check valve having threaded surfaces (i.e. interior & exterior corners), as well as stepped surfaces (more corners), where deposition thicknesses are taught to be very thin relative to the wall, with thicknesses on the order of 1000 Angstroms or less mentioned, i.e. 100 nm, and where illustrated deposition thickness is uniform, suggesting conformal, especially considering col. 3, lines 15-21 which teaches uniform flow distribution for the ion plating, and considering teachings on col. 4, lines 34-40 discussing the effects of scattering of on ion is due to collision, i.e. "throw power" employed by Hans process versus deposition from a line of sight-ion-

implanting. The implied uniformity of deposition would appear to be confirmed by the incorporated references on col. for, lines 40-50, exemplified by White (RD 3,401: abstract; col. 1, lines 20-40 & col. 2, lines 53-col. 4, lines 18, especially lines 8-18) which discusses the problems of line-of-sight deposition with respect to 3-D surfaces & teaches the type ion plating plasma used by Hahn, discussing uniform plasma density that tends to follow the geometry of the substrate, for depositing full 3-D coverage on even the most irregular surfaces; or White (4420386: abstract; col. 1, lines 15-28 for line-of-sight & 3-D problems; col. 3, lines 10-15; col. 4, lines 3-15; & col. 5, lines 20-38 with teachings comparable to White (401), noting illustrated pipe coupling (analogous to check valve), as well as teachings concerning expected usefulness on a regular surfaces in printed circuit board manufacture. While Hahn does not use the term "conformal" or explicitly state that the deposition thickness is uniform for describing their deposition, the discussion of their ion plating deposition process as presented above would appear to indicate uniform deposition thickness on a regular surfaces such as the check valve, including its corners. Alternatively, given the teachings concerning uniformity of plasma, uniformity of flow distribution, the tendency of the uniform plasma to surround the geometry of the substrate for full 3-D deposition on a regular surfaces, plus the need for services such as threaded surfaces that are being coated to remain functional in that their threads must not be filled in, it would've been obvious to one of ordinary skill in the art to optimize the ion plating process in order to insure uniformity or conformality of the deposition.

Hahn is silent as to the microstructure of the deposited titanium oxide, or other metal oxides that may be employed, however no or implied microstructure like or related limitations (i.e. possible meanings of glass-like) need to be considered in the claims as amended.

With respect to claim 13, which requires an ion plating deposition plasma source & at least one electron beam gun used therewith, while Hahn discuss details of their ion plating process with respect to

bias in the substrate & source materials (metals are metal oxides) to be employed (col. 3, line 55-col. 4, line 39), they do not provide details of the plasma apparatus employed for their ion plating process, however they provide incorporated references which do discuss method and apparatus for performing the ion plating of their process, where the suggested White (386) provides apparatus teachings as illustrated by figures 1 or 4, that employ evaporants sources that may include any suitable source, including being vaporized by an electron beam gun, which are energized into a plasma state and ion plated onto substrates using RF & DC power sources (col. 2, lines 28-68+, especially lines 38 & 65). Therefore, given that Hahn suggests employing apparatus from any one of the incorporated references, it would've been obvious to one of ordinary skill in the art to employ the specific features of the apparatus as suggested in White (386) in the specific process of Hahn et al. with reasonable expectation of success due to the explicit suggestion of such a combination.

8. **Claims 1-13 & 23** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Knapp et al.** (5,753,319), in view of **Hahn** (4,990,233) & **White** (4,420,386).

Knapp et al. (319) teach multilayer ion plating coatings comprising titanium oxide, which is preferably amorphous, as well as oxides, such as SiO_2, Al_2O_3, MgO, etc., thus due to compositional and morphological characteristics, these layers are considered to encompass possible meetings of "glass-like" coatings, as well as being non-polymeric oxides & generally dielectrics. It was noted by Knapp et al. that that the ion plated titanium oxide multilayer coatings are taught to exhibit significantly enhanced performance characteristics for lower manufacturing costs. Multilayer depositions are taught to include alternating oxide deposits. The ion plating process employs a vacuum vessel, a plasma source, one or more electron beams, which supply electrons directed towards the containment structures for the coating materials. Suitable coating materials are taught to include either the oxide or the metal thereof, which is intended to be deposited, such as titanium metal, or titanium oxide, dioxide or pentoxide, and reactive

gases such as oxygen may be employed during the process of depositing thin films. Substrates that may be so coated are taught to include semiconductor substrates, including photovoltaic & photoconductive surfaces of photodetectors and LEDs, microelectronic devices, optical filters, sighting devices, glass, plastic or metal substrates, teaching of possible coatings including bandpass filter coatings having cavities, antireflection coatings, reflector coatings, passivation layers, etc., where it is additionally taught the coating may act as a hermetic encapsulant. Particularly see the abstract, figure 5; col. 1, lines 5-22; col. 2, lines 15-35 & 53-67; col. 3, lines 35-col. 4, lines 25 & 36-45+; col. 5, lines 6-34; col. 6, line 60-col. 7, line 5 & 24-65; col. 9, lines 49-col. 10, line 13 & 46-col. 11, line 25; col. 12, lines 52-65; col. 14, lines 5-col. 15, line 67+, especially col. 15, lines 28-65; and col. 16, lines 10- 22, which mentions use in "three cavity SiO_2/TiO_x multilayer bandpass filter coatings"; plus examples.

While Knapp et al. (319) teach a fairly large variety of substrates applicable to their process, where many of the substrates might be inclusive of nonplanar substrates, none of the substrates discussed therein are necessarily nonplanar (unless the three cavity bandpass filter, means that taught multilayers are being deposited in cavities that are nonplanar, but the examiner has no idea what structure this actually represents), thus by not necessitating a nonplanar substrate differ from the present claims that require conformal deposition on a nonplanar surface. Also while Knapp et al. (319) specifically teach their coating process is applying "thin film" coating layers (col. 14, lines 9-10 & 53-55), they do not appear to recite specific layer thicknesses, although there is much discussion of alternating multilayer deposits to be employed for specific optical purposes, such as absorption or transmission, which would thus necessitate uniform deposition & thickness control in order to be effective for taught purposes.

The secondary references of **Hahn + White** (discussed above), teach ion plating of metal oxide materials onto 3-dimensional nonplanar substrates, where Hahn's are the interior surfaces of valves, which include threaded sleeve portions, stepped changes in diameter, as well as being curved surfaces or as combined with White (386), who alternatively teaches ion plating irregular surfaces of pipe interiors or

irregular circuit board surfaces (figure 3, col. 4, line 45-68), Hahn plus White are considered to teach ion plating uniform or conformal metal oxide layers on irregular surfaces, where irregular or 3-D shaped substrates inclusive of pipe interiors or nonplanar circuit board surfaces (i.e. electronic devices) are shown to be able to be equivalently coated via ion plating.

It would have been obvious to one of ordinary skill in the art to deposit amorphous titanium oxide layers as taught in Knapp et al., for the interior coatings of the valves of Hahn, since both teach deposition of titanium oxide material via analogous ion plating processes, where Knapp et al. includes metal substrates as those that can be effectively coated (col. 5, lines 16-18), and also teaches improved coating characteristics inclusive of low coating stress relative to prior ion plating techniques, noting that stress can cause problems with respect to coating layer adherence (col. 3, lines 35-42 & col. 6, lines 56-59), where reduced stress, hence improved adhesion would have been expected to be advantageous in the protective coatings of Hahn, motivating combination of the teachings. The processes may be considered further analogous considering the incorporated references in Hahn, especially White (386), who shows the equivalent uniform, i.e. conformal, deposition on substrates analogous to those of Hahn & printed circuit boards; hence given the suggestion of Knapp et al. that their ion plating process for multilayer titanium oxide coatings were suggested to be highly useful as passivation coatings on devices inclusive of electronic devices, one of ordinary skill in the art would have been motivated to provide with reasonably expectation of uniform or conformal coating capability, including multiple metal oxide coatings, by ion plating processes on suggested electronic device substrates, which are old and well-known to typically encompass nonplanar irregular surfaces including corners, specifically corners due to through holes (i.e. wells or vias), conductive wiring, etc., where it is additionally noted that in White (386)'s discussion of deposition on printed circuit boards, they explicitly mention the usefulness of the process for plating through holes, thus Hahn + White demonstratie the known effectiveness of the taught ion plating techniques on irregular electronic device surfaces, including both conductive & nonconductive substrates

for deposition of uniformed thin films of either metal & metal oxide, such that it would have been further obvious to one of ordinary skill in the art to include such substrates for the suggested multilayer oxide depositions on electronic devices in Knapp et al. (319). Furthermore, it is noted that Knapp et al. discusses the problem in evaporative deposition processes of difficulty "to optimize in terms of uniformly creating homogeneous, dense films over large areas..." (column 2, lines 10-14), which is equivalent to Hahn + White (386) discusses with respect to problems with uniformity in line-of-sight processes, thus demonstrating a further equivalence of the processing techniques of Knapp et al. & Hahn & White.

In Zöller et al., see the, for teachings of ion plating multilayer highly uniform optical coatings via ion plating, where evaporation may be via electron beam gun, in the presence of reactive oxygen gas, with possible deposition sequences include alternating Ta_2O_5 & SiO_2 layers to create a refractive, scratch resistant coating for optical lenses made of glass or synthetic plastics. Note as the deposition is taught to be uniform & a lens surface is generally curved, thus for uniform deposition on a curved surface, it must be conformal. It would've been obvious to one of ordinary skill in the art to deposit multilayer coating combinations as taught in Knapp et al., on lens substrates, such as suggested by Zoller et al., using ion plating as taught in either reference, as Knapp et al. (319) is also directed to optical substrates, inclusive of "sighting devices", which may be generically considered to encompass lenses, where the amorphous titanium oxide layer combinations would have been obvious to employ, as they are an analogous to those of Zoller et al. in structure and deposition technique, & since Knapp et al. (319) teach that the use of the amorphous titanium oxide in the multilayer combinations provides the advantages of enhanced performance characteristics at lower manufacturing prices.

9. **Zöller et al.** (5,597,622: abstract; figures 3-4; col. 1, lines 10-27; col. 2, lines 58-col. 3, lines 3-35; col. 5, lines 1-15 & 54-65; col. 6, lines 27-67+; and col. 7, lines 21- 34 (high uniformity of resultant coating)) remains of interest for nonplanar surfaces, such as optical lenses, which will inherently have curved surfaces, but which would not have been expected to have been <u>now claimed corners</u>, such at

the rejection as combined with Zoller et al. is overcome, but Zoller et al. may be considered cumulative for showings of uniform deposition of multilayer oxide coatings relevant to the above combination & claims.

Other previously cited art of interest included: Xu et al. (5,962,923) & White (4,468,309), who teach conformal ion plating processes, for three-dimensional objects with shapes as claimed (vias, trenches, steps etc.), but for metal nitride or metal depositions; Shinmi et al. (4,545,881: col. 8, line 51-col. 9, line 21) & Chi et al. (4,819,039), who teach ion plating or electron beam evaporation processes for depositing glass layers, but only mentioned flat substrates; the Japanese patent to Imai (JP 63-128166 A), whose abstract discusses ion plating titanium oxide films on still watch cases, which a show to the figures are 3-D & appear to be conformal & is considered equivalent to Hahn (233) as applied in the above rejection; and Miyamura et al. (2002/0108848 A1), plus the Japanese patents to Nakano (59-127001 A) & Morito (JP 61-010212 A), who all teach multilayer ion plating of metal oxides for various purposes inclusive of optical, but have no specific teachings necessitating nonplanar substrates.

Copending applications to Knapp (11/199606 = 2005/0281985 A1) & (11/891994), have been reviewed, where his noted that the former is to product claims, while the latter is to product & method claims, however the sole method claims is not necessarily directed to ion plating, nor the composition of the multilayer refractive coatings, nor is the shape of the substrate, thus that of the deposit specified.

10. The **disclosure is objected** to because of the following informalities: in reviewing the specification for support the examiner noted a typographical error in the last paragraph on **page 12**, where one sentence ends in two periods.

Appropriate correction is required.

11. Applicant's arguments filed 3/26/2008 & discussed above have been fully considered but they are not persuasive.

Applicant's arguments with respect to claims 1-13 & 23 have been considered but are moot in view of the new ground(s) of rejection.

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marianne L. Padgett whose telephone number is (571) 272-1425. The examiner can normally be reached on M-F from about 9:30 a.m. to 5:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached at (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Marianne L. Padgett/
Primary Examiner, Art Unit 1792

MLP/dictation software

6/17-18/2008